U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: PILOT TRANSITION COURSE FOR SELF-LAUNCHING OR POWERED SAILPLANES (MOTORGLIDERS)

Date: 7/31/84 **Initiated by:** AFO-840

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1. PURPOSE. This advisory circular provides recommendations, but is not the only means, that may be used by glider pilots who desire to transition into sailplanes or gliders with self-launching capability.

2. RELATED FEDERAL AVIATION REGULATIONS (FAR).

a.	Section 21.5	Airplane or Rotorcraft Flight Manual.
b.	Section 21.23	Issuance of Type Certificate: Gliders (Including Sailplanes), Including Fixed-Wing, Self-Launching (Powered) Gliders.
c.	Part 43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration.
d.	Part 61	Certification: Pilots and Flight Instructors.
e.	Section 91.31	Civil Aircraft Operating Limitations and Marking Requirements.
f.	Section 91.33	Powered Civil Aircraft With Standard Category U.S. Airworthiness Certificates; Instrument and Equipment Requirements.

3. BACKGROUND. Self-launching sailplanes, powered sailplanes, motorized sailplanes or motorgliders have become an increasingly common and popular type of vehicle for use in aviation sport flying. Under current regulations, a glider pilot is limited to the type(s) of launch demonstrated during the certification flight test and appropriate limitations, if any, are placed on the pilot certificate when issued. However, there are no provisions, nor are any intended, for the issuance of a powered glider rating. Some of these aircraft are designed primarily for high performance and competitive flying while others are more suitable for training. However, the basics of motorglider handling are essentially the same for all powered gliders. The low power-to-weight ratio and relatively low-wing loadings generally found in motorgliders produce performance characteristics that are similar to low-powered light fixed-wing aircraft. Specific knowledge and skills are needed for the safe and efficient operation of these aircraft in the National Airspace System.

4. PROCEDURES AND STANDARDS. This advisory circular provides recommended procedures and standards which may be followed for a thorough and comprehensive checkout in motorgliders.

a. The following courses of training may be used to prepare a pilot for checkout in a motorglider.

(1) Syllabus "A." For those pilots who possess at least a private pilot certificate with an airplane single-engine land rating and a glider rating.

(2) Syllabus "B." For those pilots who possess at least a private pilot certificate with a glider rating only.

b. A pilot who wishes to obtain a checkout in motorgliders in accordance with this advisory circular should:

(1) Meet the experience and checkout qualifications outlined herein; and

(2) Satisfactorily accomplish a flight check in a two-place motorglider, if available, given by a certificated flight instructor who:

(i) Holds commercial pilot privileges for airplane single-engine land rating and a glider rating;

(ii) Holds a current Federal Aviation Administration flight instructor certificate with a glider rating; and

(iii) Meets the requirements of Syllabus "A" as outlined in this advisory circular.

c. A pilot who holds at least a private pilot certificate with a glider rating and can show by logbook entry that he/she has had at least 5 hours of pilot-in-command experience in a motorglider before January 1, 1985, will be considered to have met the guidelines of this advisory circular.

5. AIRCRAFT REQUIREMENTS. For the purpose of this advisory circular, a two-place motorglider should be used to acquire flight instructional experience to qualify a pilot in motorgliders. Either a single or two-place motorglider may be used to acquire solo flight experience.

6. CHECKOUT SYLLABI.

a. Objective and Scope. This outlines the syllabi which may be used to prepare pilots for checkout in motorgliders. While no specific training hours are suggested, it is expected that the required training time my be reduced for pilots who have extensive qualifications, or increased for pilots who do not meet the pilot certification guidelines listed herein, or who meet those pilot certification guidelines but have little or no recent flight experience.

b. Syllabi Application. The particular syllabus utilized my be modified to fit the qualifications of the trainee, the aircraft used, and/or the circumstances under which the training is given, provided the desired proficiency standards are met.

(1) Syllabus "A." The following minimum guidelines are appropriate for pilots who possess at least a private pilot certificate with an airplane single-engine land rating and a glider rating:

(i) Three dual takeoffs and three dual landings in a motorglider, each to a full stop;

(ii) A flight check given by a certificated flight instructor who is authorized to conduct flight checks in motorgliders in accordance with this advisory circular; and

(iii) A pilot logbook endorsement by that instructor certifying that the pilot has satisfactorily completed the following ground and flight training syllabus guidelines:

(A) Ground Instruction.

(1) General operating and flight rules of FAR Part 91.

(2) Aircraft Flight Manual; Pilot's Operating Handbook; or Operating Limitations in the form of manual, material, markings, and placards; or a combination thereof.

(3) Aircraft systems.

(4) Line inspection.

(5) Aircraft assembly/disassembly (with appropriate aircraft logbook entries).

(6) Weight and balance.

(7) Cockpit familiarization.

(8) Ground operation/handling safety.

(9) Performance limitations; power on and power off.

(10) Off-airport landing area selection.

(11) Use of spoilers, dive brakes, and flaps, as appropriate.

(12) Emergency and abnormal operations.

(B) Flight Instruction.

(1) Starting/taxiing.

(2) Normal takeoffs and landings.

(3) Flight at minimum controllable airspeeds and stalls.

(4) Engine operations: Shutdowns and restarts (ground and flight), as appropriate.

(5) Operation of aircraft systems, including fuel management.

(6) Short- and soft-field takeoffs and landings.

(7) Normal approaches/steep approaches using spoilers, dive brakes, and flaps, or side-slip.

(8) Soaring techniques (locating lift and avoiding sink).

(9) Ground reference maneuvers.

(10) Cross-country procedures, including emergency landing area selection.

(11) Emergency and abnormal operations.

(2) Syllabus "B." The following guidelines are appropriate for pilots who possess at least a private pilot certificate with a glider rating only:

(i) Five hours of flight time in motorgliders, at least 2 hours of which were in solo flight;

(ii) Ten takeoffs and 10 landings to a full stop in motorgliders in solo flight, including at least 5 landings with the engine shut down;

(iii) A dual cross-country and a solo cross-country flight in a motorglider and an instructor's endorsement in the pilot's log with a landing at a point more than 25 miles from the airport of first takeoff;

(iv) A flight check given by a certificated flight instructor who is authorized to conduct flight checks in motorgliders and;

(v) A pilot logbook endorsement by that instructor certifying that the pilot has satisfactorily completed the following ground and flight training syllabus guidelines:

(A) Ground Instruction.

(1) General operating and flight rules of FAR Part 91.

(2) Aircraft Flight Manual; Pilot's Operating Handbook; or Operating Limitations in the form of manual, material, markings, and placards, or a combination thereof.

(3) Aircraft system.

(4) Line inspection.

(5) Aircraft assembly/disassembly (with appropriate aircraft logbook entries).

(6) Weight and balance.

(7) Cockpit familiarization.

(8) Engine operation.

(9) Ground operation/handling safety.

(10) Performance limitations, power on and poweroff.

(11) Use of spoilers, dive brakes, and flaps, as appropriate.

(12) Off-airport landing area selection.

(13) Emergency and abnormal operations.

(14) Comparison of sailplanes and motorgliders.

(15) Sailplane versus motorglider characteristics as they relate to safety.

(16) Density altitude considerations.

(17) Cross-country flight planning, VOR navigation and radio communications usage, and pilotage and dead reckoning, as appropriate.

(b) Flight Instruction.

(1) Starting/taxiing.

(2) Normal takeoffs and landings.

(3) Takeoff, climb, cruise, descent, and landing (engine operating).

(4) Engine operations: Shutdowns and restarts (ground and flight), as appropriate.

(5) Operation of aircraft systems, including fuel management.

(6) Emergency and abnormal operations.

(7) Flight at minimum controllable airspeeds.

(8) Stalls/spins, as appropriate.

(9) Short- and soft-field takeoffs and landings.

(10) Normal approaches/steep approaches using spoilers, dive brakes, and flaps, or side-slip.

(11) Soaring techniques (locating lift and avoiding sink).

(12) Ground reference maneuvers.

(13) Emergency landing area selection.

(14) Cross-country procedures, pilot age navigation, landing at strange airports, and off-airport landings.

(15) Radio communications/navigation procedures.

c. Directed Solo Practice. One solo cross-country flight to be conducted under instructor supervision with appropriate endorsement(s) in which a landing is made at an airport more than 25 miles from the starting point.

Note: The list of ground and flight instructional subjects shown are provided to guide the instructor in the general areas appropriate to motorgliders. They are not intended to be all-inclusive or to limit instruction to the specific areas listed.

7. CHECKOUT PROCEDURES AND STANDARDS.

a. Objective and Scope. This outlines the procedures and standards which may be used to prepare the pilot for checkout in a motorglider and to evaluate the pilot's competence and ability to conduct motorglider flight operations safely.

b. Preflight Examination. Prior to the final flight check, the pilot should satisfactorily accomplish a test on the aircraft to be used, including its systems, operating limitations, performance, and emergency procedures. This test may consist of either an oral or written examination administered by the instructor who conducts the flight check. The preflight examination should include at least the following items:

(1) The Aircraft Flight Manual or Pilot's Operating Handbook, as appropriate, placards, markings, limitations, and required maintenance inspections.

(2) A working knowledge of engine operation at various altitudes and under various conditions of flight, including power settings, fuel management, consumption, endurance, landing distances, best angles and rates of climb and descent, minimum sink speed, and best L/D speed.

(3) Normal and emergency operation of the aircraft's systems and special equipment unique to the motorglider.

(4) A practical computation of various combinations of the permissible weight and balance loading for pilots, passengers, fuel, and ballast, as appropriate.

(5) A thorough line check of the aircraft to be used, using a checklist provided by the manufacturer or operator. If no such checklist is available, the check should be made in accordance with an orderly procedure to ensure that all items appropriate to the aircraft used are covered. The presence of all required certificates, documents, and placards should be determined and an adequate supply of fuel and oil should be ensured. The inspection should cover all airworthiness items that can be examined by external examination, including the proper assembly of the aircraft for flight. The pilot should know the significance of any unsatisfactory item noted ad the appropriate corrective action to be taken for each such item.

(6) Cross-country flight planning, including all aspects of weather reports, forecasts, analysis, terrain, navigation, radio communications, ad Air Traffic Control requirements as they relate to the proposed flight.

8. FLIGHT MANEUVERS AND PROCEDURES. The flight maneuvers and procedures discussed herein are representative of the pilot operations prescribed by FAR Part 61 for pilot certification in both airplanes and gliders. These maneuvers and procedures are, therefore, appropriate for use in training pilots to competence in flight proficiency in motorgliders. Although pilots may intend to pilot only single-place, high-performance motorgliders, a pilot checkout in accordance with this advisory circular should prepare the pilot for safe flight operations in both single-place and multiplace motorgliders and for the carriage of passengers. Because a motorglider may have predominant characteristics of either an airplane or a glider while operated on the ground or in flight, particular attention should be given in pilot training to ensure that all characteristics with which the pilot may not be familiar are thoroughly explained.

a. Ground handling procedures and precautions for both airplanes and gliders should be covered. The pilot should be instructed in the hazards of a rotating propeller. The proximity of a nose-mounted or an overhead-mounted propeller to the cockpit of the motorglider and its inherent danger to the motorglider occupants and bystanders should be stressed. Both the pilot and line personnel should be instructed in propeller safety precautions and avoidance procedures. The pilot should be instructed in proper ground handling of the motorglider in both power-on and power-off modes. The pilot should be able to demonstrate, with and without ground crew assistance, safe and efficient taxiing while in close proximity to other aircraft, persons, or obstructions, and under varying wind and surface conditions.

b. Standard coordination and planning maneuvers may be performed by the pilot to demonstrate familiarity with the motorglider's performance and flight control responses. Either simple maneuvers such as medium banked turns of 20 to 30° or more complex maneuvers such as 720° power turns, chandelles, and lazy eights may be performed to demonstrate proper coordination and planning. Coordination and planning maneuvers should be demonstrated both to the right and the left, at various speeds within the normal airspeed range of the aircraft, and with various flaps/spoiler and landing gear configurations. Properly coordinated turns, smooth

control usage, and division of attention should be demonstrated. The pilot should be able to perform all standard coordination maneuvers while maintaining the ball not more than one-half ball width outside the enter reference lines of a standard slip-skid indicator, and the "yaw string" if installed, streamlined within + one-half inch of the centerline of the aircraft. Prolonged turns should be stopped within +10° of an assigned heading, and airspeed maintained within ±5 knots of that desired.

c. Collision Avoidance Precaution+ The pilot should exercise continuous surveillance of the airspace in which the aircraft is being operated to guard against potential midair-collisions. Adequate clearing procedures should precede the execution of maneuvers involving either rapid altitude or heading change. The pilot should perform whatever clearing procedures are deemed necessary to ascertain that the area is clear before performing maneuvers such as stalls, flight at critically slow airspeeds, or other maneuvers unique to gliders. The pilot should also be familiar with right-of-way rules for utilizing lift as it is encountered from thermals, ridge areas, or when soaring in the vicinity of wave clouds.

d. Standard ground reference maneuvers my be performed by the pilot to demonstrate the ability to accurately control the path of the aircraft over the ground and anticipate turns to specified headings. In the execution of rectangular courses, s-turns across a road, turns about a point, or eights around pylons, the pilot should be able to correct for wind drift while operating the aircraft over a predetermined groundpath and dividing attention inside and outside the aircraft. Properly coordinated turns, smooth control usage, and division of attention should be demonstrated.

e. Flight at minimum controllable airspeed in climbs, in level flight on constant headings, in medium [illegible] and in descents may be performed by the pilot to demonstrate minimum controllable soaring and landing approach airspeeds with appropriate power settings. The minimum controllable airspeed used should be such that any further reduction in airspeed or increase in load factor would result in immediate indications of a stall. The pilot should be able to demonstrate smooth, positive control of the aircraft and maintain the appropriate speed within ±5 knots.

f. Stalls. Stall entries and recoveries should be demonstrated with and without power and in various flaps/spoiler and landing gear configurations. Emphasis should be placed on recovery from these critical stall situations: Takeoff and departure, approach to landing (in both normal and in cross-control configuration), and accelerated maneuvers. Recovery should be initiated as soon as the first physical indication of the stall is recognized.

g. Spins. Spins should be practiced within the limitations of the motorglider used and in conformance with the requirements of FAR Part 91. Stall and incipient spin recovery performance should be evaluated on the basis of prompt recognition and smooth, positive recovery. Recovery should be effected with proper use of the flight controls and the least loss of altitude consistent with prompt recovery of positive flight control. The pilot should be familiar with the manufacturer's recommendations concerning stall/spin avoidance and recovery as published in the specified Motorglider Flight Manual.

h. Maximum Performance Operations. Soft-field and short-field takeoffs and landings should be demonstrated in accordance with the procedures specified in the specific Motorglider Flight Manual or owner's handbook. Special emphasis should be placed on the use of spoilers, dive brakes, flap and trim settings, power usage, and best angle-of-climb or best rate-of-climb airspeeds, as appropriate. The pilot should demonstrate knowledge and awareness of the effects of landing surface, density altitude, and wind and other atmospheric phenomena.

i. Radio Communications/Navigation. The pilot should be able to demonstrate the proper use of designated radio frequencies and appropriate communications procedures to obtain and acknowledge necessary information in conducting the flight. Where appropriate, the pilot should be able to demonstrate radio navigation procedures and the location of associated fuses and circuit breakers and how to replace or reset them. Where operations are expected to be conducted at tower controlled airports, normal radio communication procedures should be demonstrated.

j. Special Equipment. The pilot should be familiar with, and be able to demonstrate the proper use of, all special equipment installed, such as cowl flaps, performance flaps, spoilers, dive brakes, engine-retraction systems, propeller feathering and positioning, and gyroscopic instrumentation. The pilot should be thoroughly familiar with starting and stopping the aircraft engine in flight and any special precautions necessary.

k. Soaring Flight. The primary purpose of a motorglider is to provide self-launching capability or auxiliary power to initiate or sustain flight where otherwise it would be impracticable. However, the pilot should be proficient in searching out lift and utilizing it where encountered in the normal flying area. Also, the pilot should be able to utilize the auxiliary power in traversing areas of sink, to sustain flight and avoid an off-airport landing where a landing would be undesirable, or to make maximum altitude gains in areas of weak lift.

l. Off-Airport Landing. The pilot should be able to demonstrate satisfactory off-airport landing procedures either by accomplishing an actual landing where such a landing, would be both safe and practicable or by simulating an approach to a landing where a landing could be made safely. Also, the pilot should be able to demonstrate a landing from traffic pattern altitude with the aircraft engine set at zero thrust and, utilizing flaps, spoilers, or dive brakes as necessary to control the glidepath, touchdown beyond a designated point, and bring the aircraft to a safe stop within a distance specified by the instructor conducting the check.

m. Cross-Country Flight. The pilot of a motorglider is able to exercise greater freedom in cross-country flight than is the person operating a glider without Power assistance. Thus, it is expected that the motorglider will be utilized in an increasing amount of cross-country flying activities. Therefore, a significant amount of transition training in motorgliders should be devoted to preparing the pilot for safe cross-country flight operations in motorgliders. Although it may be expected that radio navigation will be used if the motorglider is radio equipped, it is essential that the pilot be thoroughly familiar in navigation by pilotage. The pilot should know how to obtain and use weather

reports and forecasts pertinent to the flight or while enroute, weather conditions to mid, and the procedure for precautionary landings, should such a landing become necessary. The motorglider's capability to avoid prohibited or restricted airspace, unsuitable terrain, or deteriorating weather conditions should be emphasized. The pilot should be able to effectively use all communications, navigation, and/or special equipment installed in the motorglider in both normal ad abnormal (emergency) conditions.

n. Flight Instructor Checks for Competency. The pilot transitioning to motorgliders should be able to demonstrate a satisfactory level of pilot competency in flight planning and preparation, taxiing in confined space and under varying wind conditions, takeoffs and landings, communications, navigation, and emergency operation of all equipment installed in the motorglider. The flight instructor conducting the flight check should endorse the pilot's logbook certifying satisfactory completion of the training and checks as outlined under this advisory circular.

o. Flight Instructor Endorsement. An example of a logbook endorsement certifying pilot competency in motorgliders follows:

"Checkout in (make and model) motorglider satisfactorily accomplished in accordance with Advisory Circular 61-94 on (Date).

/s/ (Certified Flight Instructor)
CFI 1234567 EXP 4/30/84"

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